MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

The Ribbon Hotel

Noise Impact Assessment

Rooftop Bar

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 98 145 324 714
www.acousticlogic.com.au

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1 INTRODUCTION

This report presents our assessment of the likely noise impact on surrounding occupancies from amended operational activities (increasing of noise levels from amplified music) associated with the rooftop bar at The Ribbon Hotel, Darling Harbour.

This report will:

- Identify relevant noise emission criteria applicable to the project site.
- Identify nearby noise sensitive receivers and any project site noise sources with the potential to adversely impact nearby developments.
- Predict noise emissions and assess them against established acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

Relevant noise criteria for the assessment is contained in the development consent for SSD 7388, as well as standard licensing conditions from NSW Liquor & Gaming.

2 SITE DESCRIPTION & PROPOSAL

The current operation of the rooftop bar inclusive of an open roof was approved as part of Modification 7 of the development consent. As part of the approval the following conditions were included in relation to the operation of the rooftop bar:

> ***F9(1)*** *All speakers within the level 22 and 23 swimming pool and bar area are to be located within covered areas and limited to the following maximum sound pressure levels:*
>
> *a) Between 7am and Midnight: 80 dB(A) L10 when measured at 3m distance from speakers./*
>
> *b) Between Midnight and 7am: 65 dB(A) L10 when measured at 3m distance from speakers.*
>
> ***F13*** *Noise levels at levels 22 and 23 shall be managed in accordance with the recommendations of the Noise Impact Assessment prepared by Acoustic Logic and dated May 2019*

As part of this application, it is proposed that the noise levels within the bar area be increased to the following:

- Between 7am – 12am: 90 dB(A) L_{10} sound pressure level when measured at 3m distance from speakers.
- Between 12am – 7am: 80 dB(A) L_{10} sound pressure level when measured at 3m distance from speakers.

In addition, it is proposed to amend Condition F15 regarding patron numbers to the following:

> ***F12*** *Use of the level 22 and 23 swimming pool and bar area is restricted to hotel guests only after **2am on Saturday and Sunday mornings or** midnight **on all other days**, and total patron numbers restricted as follows:*
>
> *(a) Between 7am and **2am (Saturday and Sunday mornings)** or midnight **(all other days)**: not exceeding 300 patrons at any one time*
>
> *(b) Between **2am (Saturday and Sunday mornings) or** midnight **(all other days)** and 7am: not exceeding 200 patrons at any one time.*

The nearest residential development to the site is located at Millennium Towers on the corner of Bathurst, Sussex and Day Streets. Refer to Figure 1 for detail.

Figure 1 - Project Site, Noise Receivers and Measurement Locations - Source: Six Maps

Project Site

Residential/Hotel Receivers

Unattended Noise Monitors

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L10, L90 and Leq.

The L10 and L90 measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L10 parameter is commonly used to measure noise produced by a particularly intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L90 level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L90 parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L90 level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. Leq is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The L_{max} parameter represents the highest sound pressure level during a measurement period.

4 BACKGROUND NOISE LEVELS

Attended and unattended background noise measurements were obtained in order to characterise the existing noise environment.

4.1 UNATTENDED NOISE MEASUREMENTS

Equipment used for unattended measurements consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the unattended monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

Noise monitoring data was obtained during the period from 30th April to 7th May 2019. The existing background noise environment is dominated by traffic and industrial noise sources (mechanical plant).

Summarised rating background noise levels for the project site and immediate surroundings are presented below. Weather affected data has been removed in line with the recommendations of Fact Sheets A & B of the NSW EPA Noise Policy for Industry.

Summarised rating background noise levels are presented below.

Table 1 – Summary of Background Noise Levels

Noise Monitor Location	Rating Background Noise Level dB(A)$L_{90(period)}$			
	Daytime (7:00am to 6:00pm)	**Evening (6:00pm to 10:00pm)**	**Late Evening 10:00am to 12:00am**	**After Midnight (12:00am to 7:00am)**
Nearest Residential Buildings	64	62	60	58

4.2 BACKGROUND NOISE SPECTRUM MEASUREMENTS

In addition to the unattended noise monitoring, attended background noise measurements have been collected to characterise the noise spectrum for surrounding receivers. An external background noise spectrum representative of the area is presented in the table below.

Table 2 – Measured Background Noise Spectrums (External) – dB(A)L_{90}

Frequency	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Background Spectrum Measurement	67	67	65	63	57	53	48	46	39	**60**

5 NOISE EMISSION CRITERIA

Noise emission goals for the assessment of the general operation of the venue have been determined in accordance with the requirements of development consent 7388 (including MOD7) and the NSW Liquor & Gaming Standard Licensing Conditions relating to noise.

5.1 DEVELOPMENT CONSENT SSDA 7388

Noise

F9 The emission of noise associated with the use of the premises including the operation of any mechanical plant and equipment shall comply with the following criteria:

a) the LAeq, 15 minute noise level emitted from the use must not exceed the background noise level LA90, 15 minute by more than 5dB when assessed at the boundary of any affected residence.

b) The LAeq, 15 minute noise level shall be adjusted for modifying factors in accordance with Appendix 2 of the Noise Guide For Local Government published by the DECCW

c) The background noise level shall be measured in the absence of noise emitted from the use in accordance with Australian Standard AS 1055.1-1997 – Description and measurement of environmental noise.

d) The use of the premises shall be controlled so that any emitted noise is at a level so as not to create offensive noise as defined in the Protection of the Environment Operations Act 1997 to any affected residence.

5.2 LIQUOR & GAMING NSW STANDARD REQUIREMENTS

L&GNSW provide a standard noise condition to be applied when assessing noise from licensed premises, which is presented below.

Standard LA10 Noise Condition

The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) by more than 5dB between 7.00am and 12:00 midnight at the boundary of any affected residence.*

The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between 12:00 midnight and 7:00am at the boundary of any affected residence.*

Notwithstanding compliance with the above, the noise from licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 7:00am.

**For the purpose of this condition, the LA10 can be taken as the average maximum deflection on a sound level meter of noise emitted from the licensed premises.*

We note that these criteria are typically adopted by the City of Sydney in the assessment of entertainment venues, and presents a more stringent requirement than noted in condition F9. As such, noise from the use of the rooftop bar will be reviewed with reference to these conditions.

5.3 SUMMARY OF NOISE EMISSION CRITERIA

The following table presents the resulting noise emission requirements for the site, based on the requirements outlined above.

Table 7– Patron/Music Noise to Residential Receivers (dB(A)L_{10}) - Externally

Time of Day	Frequency (Hz)									A-wt.
	31.5	63	125	250	500	1k	2k	4k	8k	
7am – 6pm (BG+5dB(A))	76	76	74	72	66	62	57	55	48	**69**
6pm – 10pm (BG+5dB(A))	74	74	72	70	64	60	55	53	46	**67**
10pm-12am (BG+5dB(A))	72	72	70	68	62	58	53	51	44	**65**
12am-7am (BG+0dB(A))	65	65	63	61	55	51	46	44	37	**58**

6 NOISE EMISSION ASSESSMENT

This section of the report examines the potential noise impacts from the proposed venue. The main potential sources will be patron noise and amplified music. Noise from the various activities associated with the proposal has been predicted to the closest affected residential receivers as identified in Section 2. Note that other receivers are located further from the site and as such exposed to a lower level of noise. By demonstrating compliance at the closest receiver, noise from site operations will also be compliant at receivers located an additional distance from the site. Furthermore, predictions have been made for the most stringent time periods. Compliance at these periods will ensure compliance at all times.

The noise predictions are based on typical noise levels likely to be generated from the venue. These emission levels are corrected for distance attenuation, barrier effects (where applicable) and the orientation of the respective receivers to determine the resultant noise level at the potentially affected properties.

6.1 ASSUMPTIONS ADOPTED WITH RESPECT TO NOISE EMSSION CALCULATIONS

Predicted noise levels within the venue are made based on the following assumptions. As the patron population after midnight on Saturday and Sunday mornings is higher than proposed for remaining days (i.e. 300 patrons), this operational scenario has been presented below. For remaining days where the population is limited to a maximum of 200 patrons, noise levels from the use will be marginally lower than presented.

- The total population for the rooftop bar (as proposed with the amendment of condition F12 of SSD 7388 MOD7) are:
  - Between 7am and midnight – not exceeding 300 patrons at any one time
  - Between midnight and 2am – not exceeding 300 patrons at any one time.
- That music sound pressure levels within the venue (internally) are controlled as follows:
  - Between 7am and midnight – up to 90 dB(A) $L_{10(15minute)}$ at 3m from installed speakers.
  - Between midnight and 7am – up to 80 dB(A) $L_{10(15minute)}$ at 3m from installed speakers.
  - A sound spectrum for typically bass heavy music has been used for the assessment (adjusted for the overall noise levels identified above), and is detailed below:

Noise Source	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Amplified Music	76	82	78	77	76	71	62	64	**80**

- That typical patron vocal sound power levels are:
  - Up to 80dB(A)L_{10}, with 1 in 2 speaking at any one time (raised voice).
  - A typical sound spectrum of a patron as follows:

Noise Source	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Raised Voice	65	73	73	79	76	71	62	50	**80**

6.2 PREDICTED NOISE EMISSIONS

Predicted noise levels are presented in the tables below.

Table 11 - Predicted Noise Emissions – Millennium Towers – 10pm – 12am (External)

Location	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Levels dB(A) L_{10}	56	56	62	58	57	56	51	42	44	**60**
Criteria dB(A) L_{10}	72	72	70	68	62	58	53	51	44	**65**
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 11 - Predicted Noise Emissions – Millennium Towers – 12am – 2am (External)

Location	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Levels dB(A) L_{10}	42	42	48	43	43	41	33	21	19	**45**
Criteria dB(A) L_{10}	65	65	63	61	55	51	46	44	37	**58**
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

7 RECOMMENDATIONS

In order to ensure operational noise emissions compliant with criteria outlined in Section 5, the following management controls are recommended:

- Any installed speakers are to be installed within a covered area of the bar, such that the building form acts as a screen to nearby residential receivers (to the south).
- Patron numbers are to be limited to the following;
  - Between 7am – 12am – up to 300 patrons within the rooftop bar at any one time.
  - Between 12am – 2am (on Saturday and Sunday mornings – up to 300 patrons within the rooftop bar area at any one time.
  - Between 2am – 7am (on Saturday and Sunday mornings) – up to 200 patrons within the rooftop bar area at any one time.
  - Between 12am – 7am (on all other days) – up to 200 patrons within the rooftop bar area at any one time.
  - Between 12am – 7am – Up to 200 patrons within the rooftop bar at any one time.
- Noise levels from speakers are to be limited to the following sound pressure levels;
  - Between 7am – 12am: 90 dB(A) L_{10} sound pressure level when measured at 3m distance from speakers.
  - Between 12am – 7am: 80 dB(A) L_{10} sound pressure level when measured at 3m distance from speakers.

8 CONCLUSION

This report presents our assessment of the likely noise impact on surrounding occupancies from amended operational activities (increasing of noise levels from amplified music and patron numbers) associated with the rooftop bar at The Ribbon Hotel, Darling Harbour.

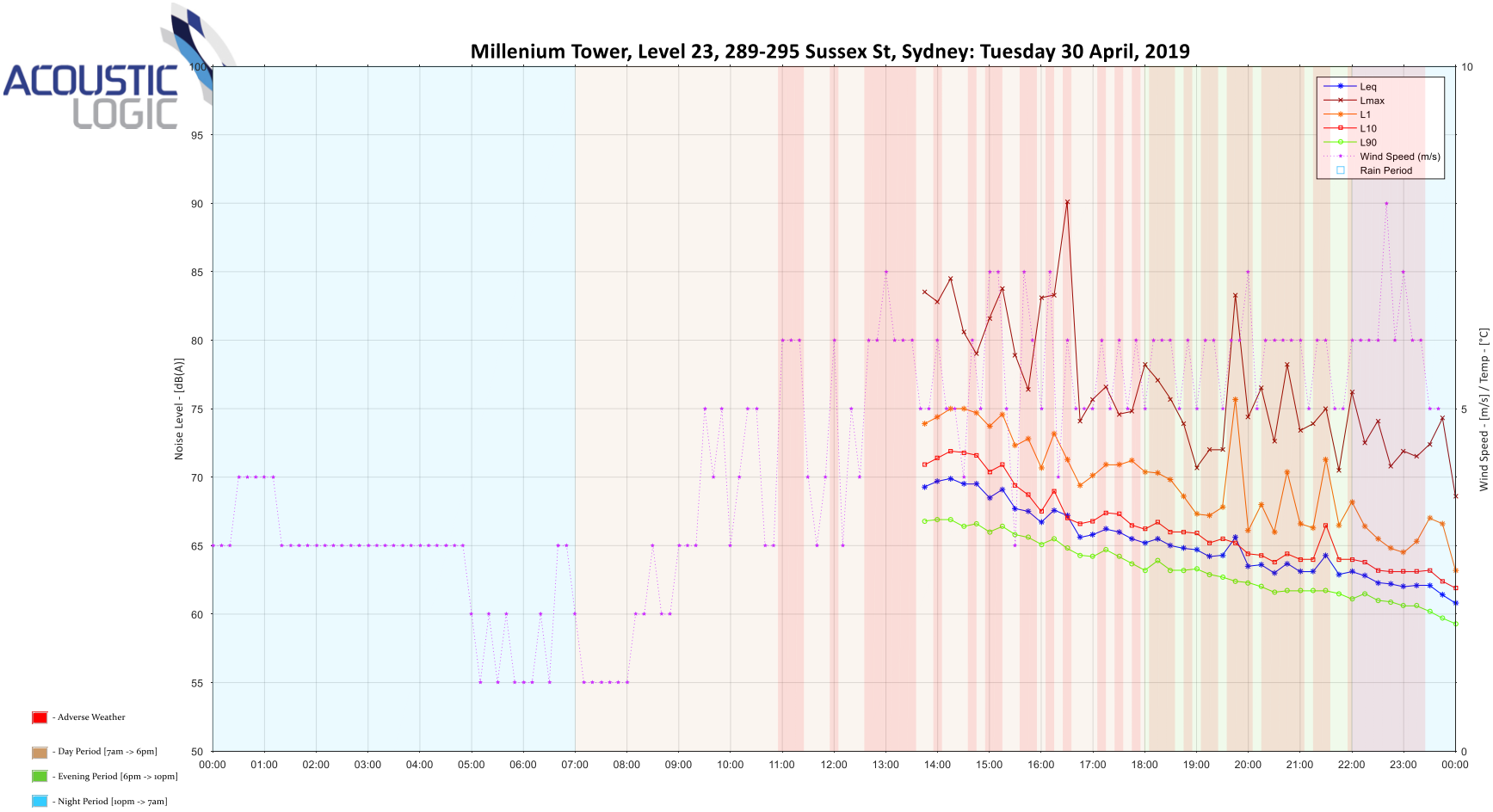
Provided that the recommendations in Section 7 of this report are adopted, noise emissions are expected to comply with the proposed amended requirements of SSD 7388 and NSW Liquor & Gaming Standard Noise Conditions.

Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Alex Washer

APPENDIX ONE – UNATTENDED NOISE MONITORING DATA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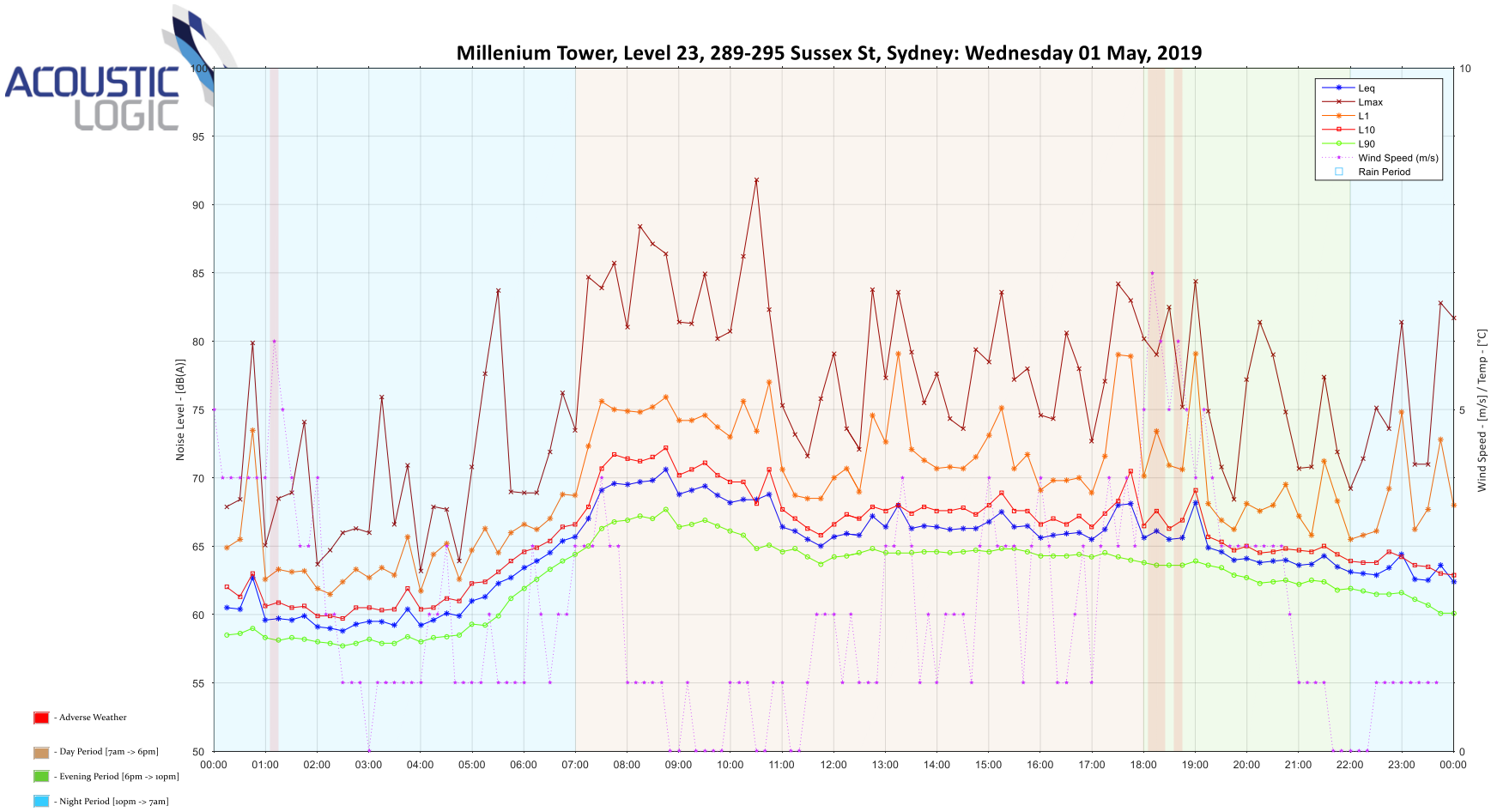
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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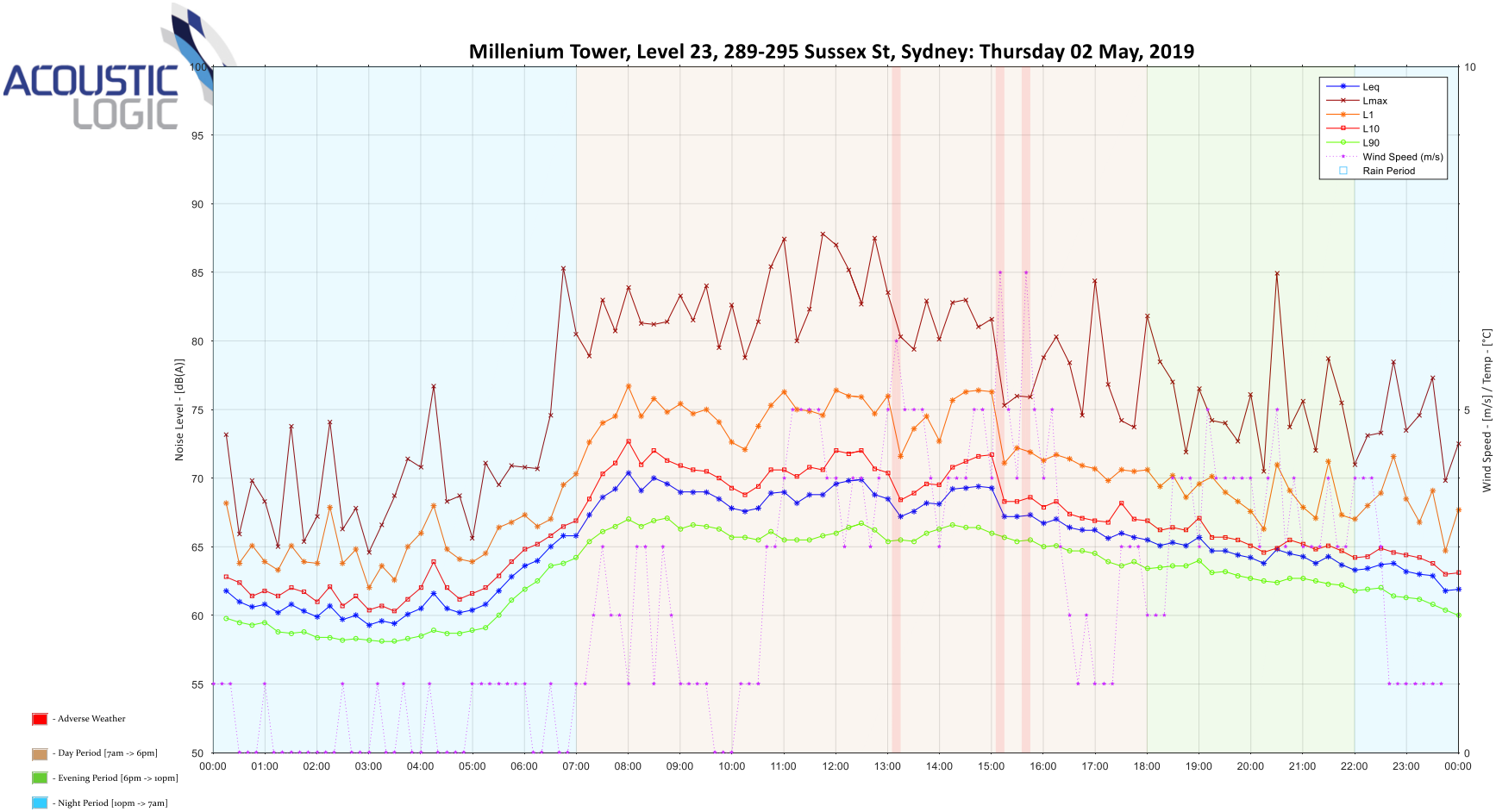
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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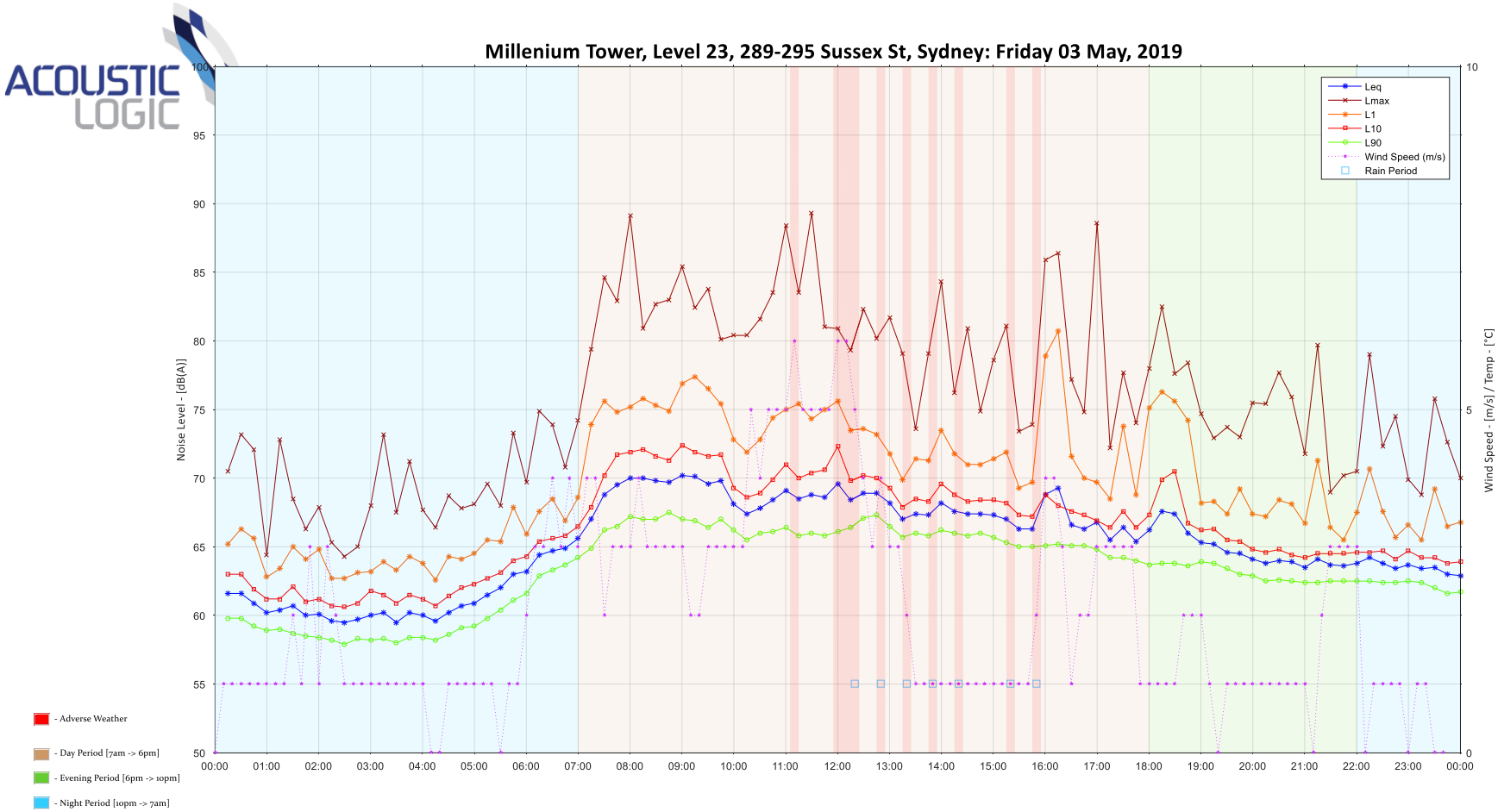
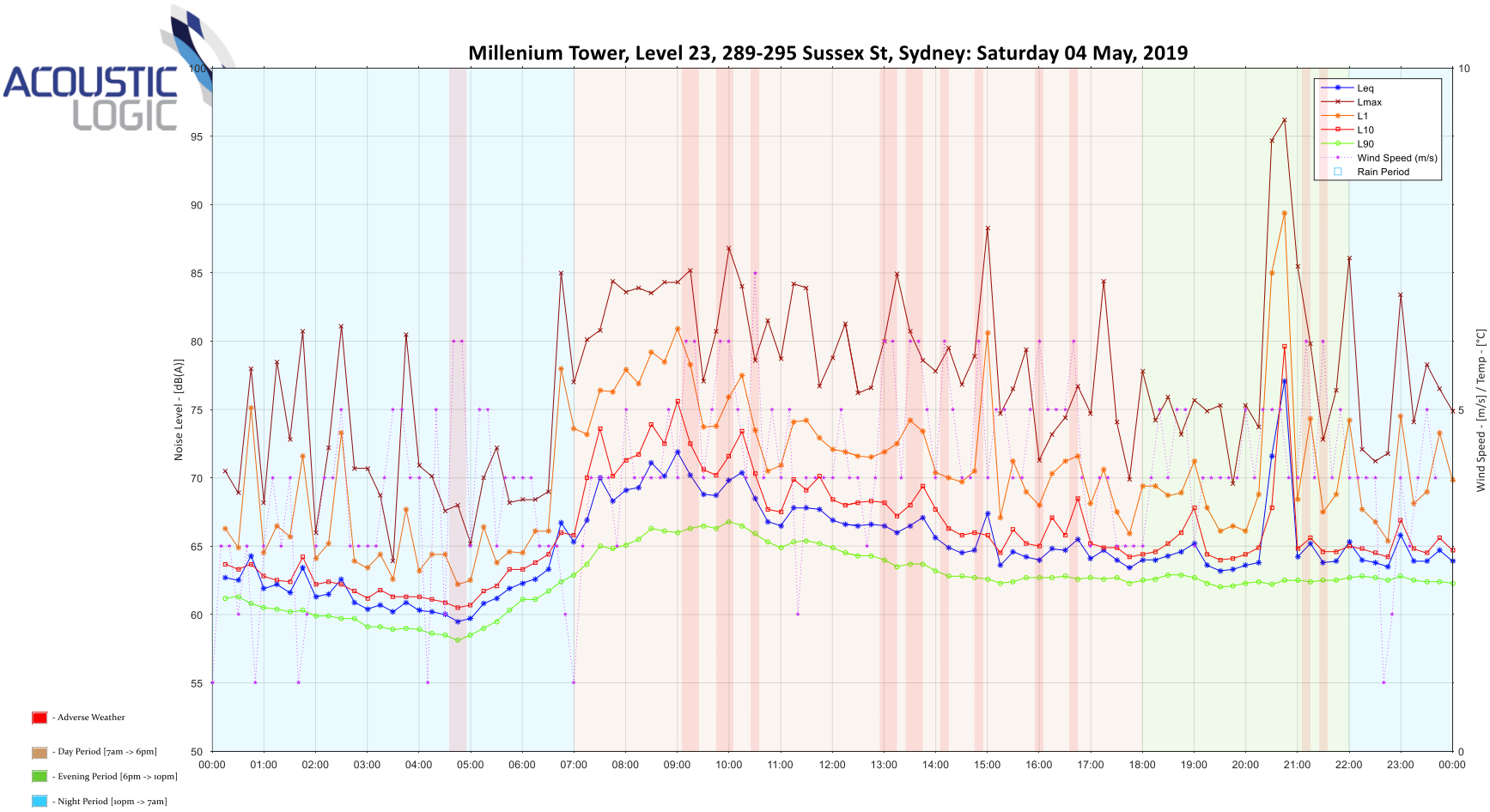
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Friday 03 May, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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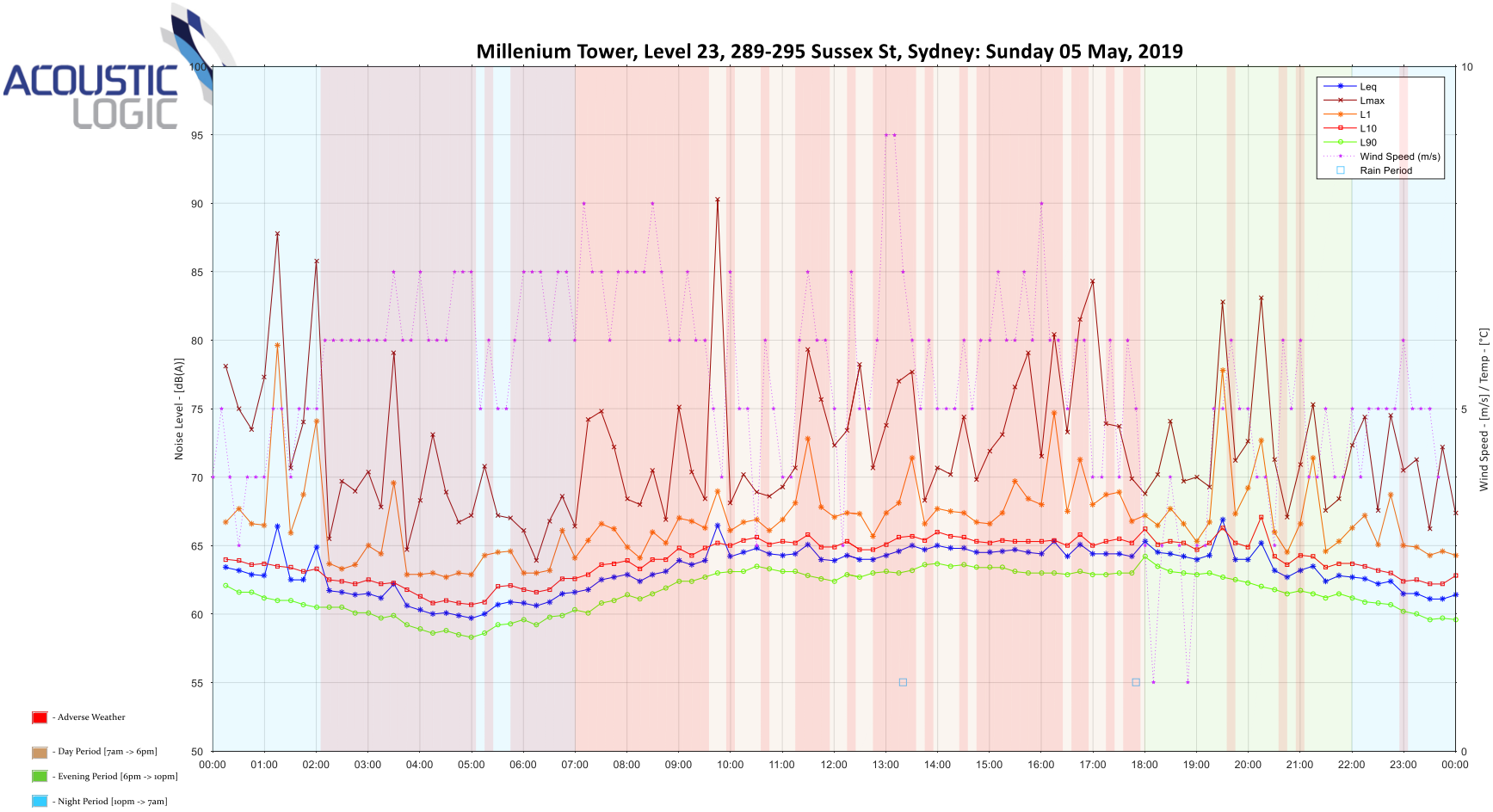
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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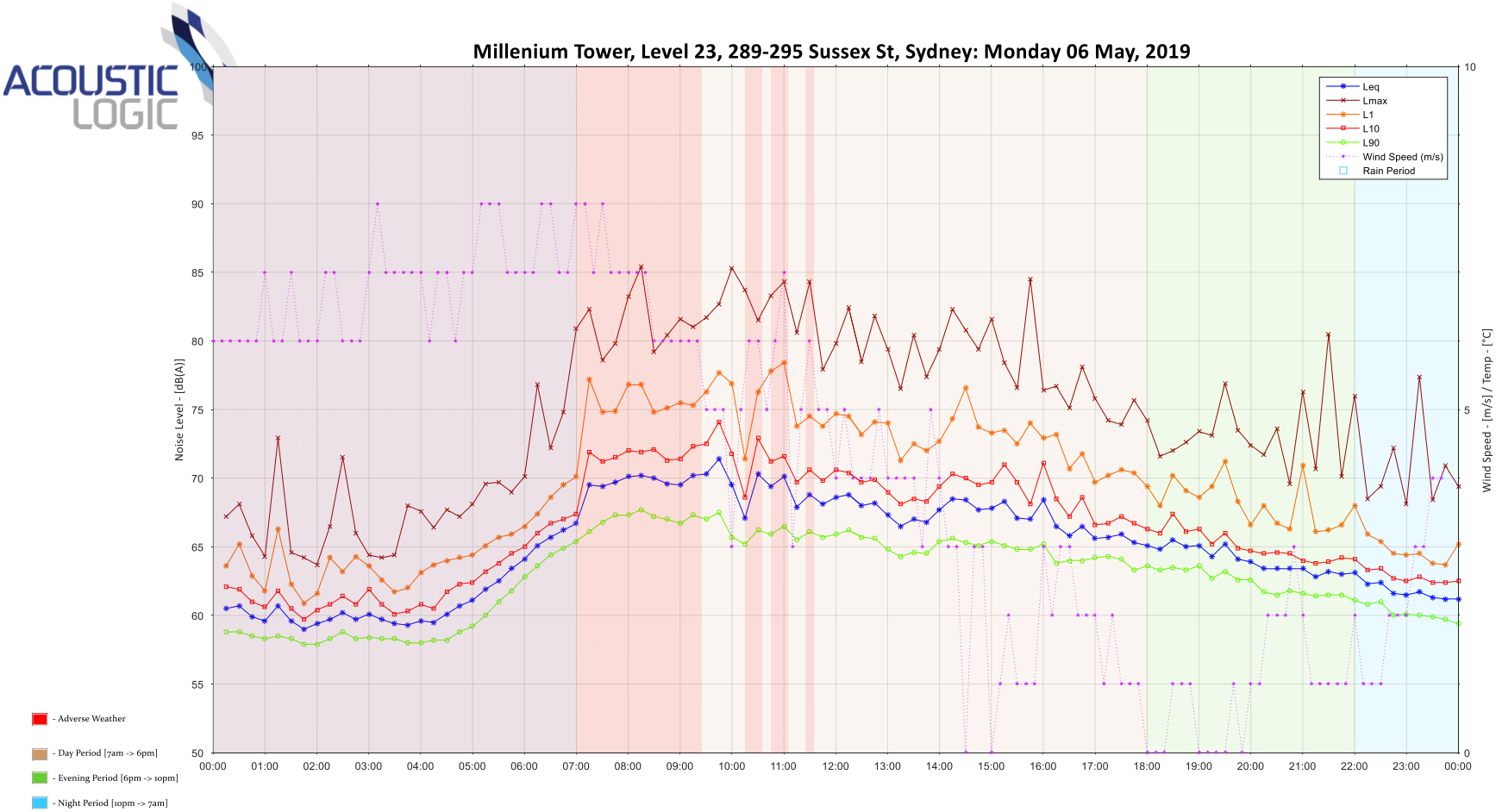
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]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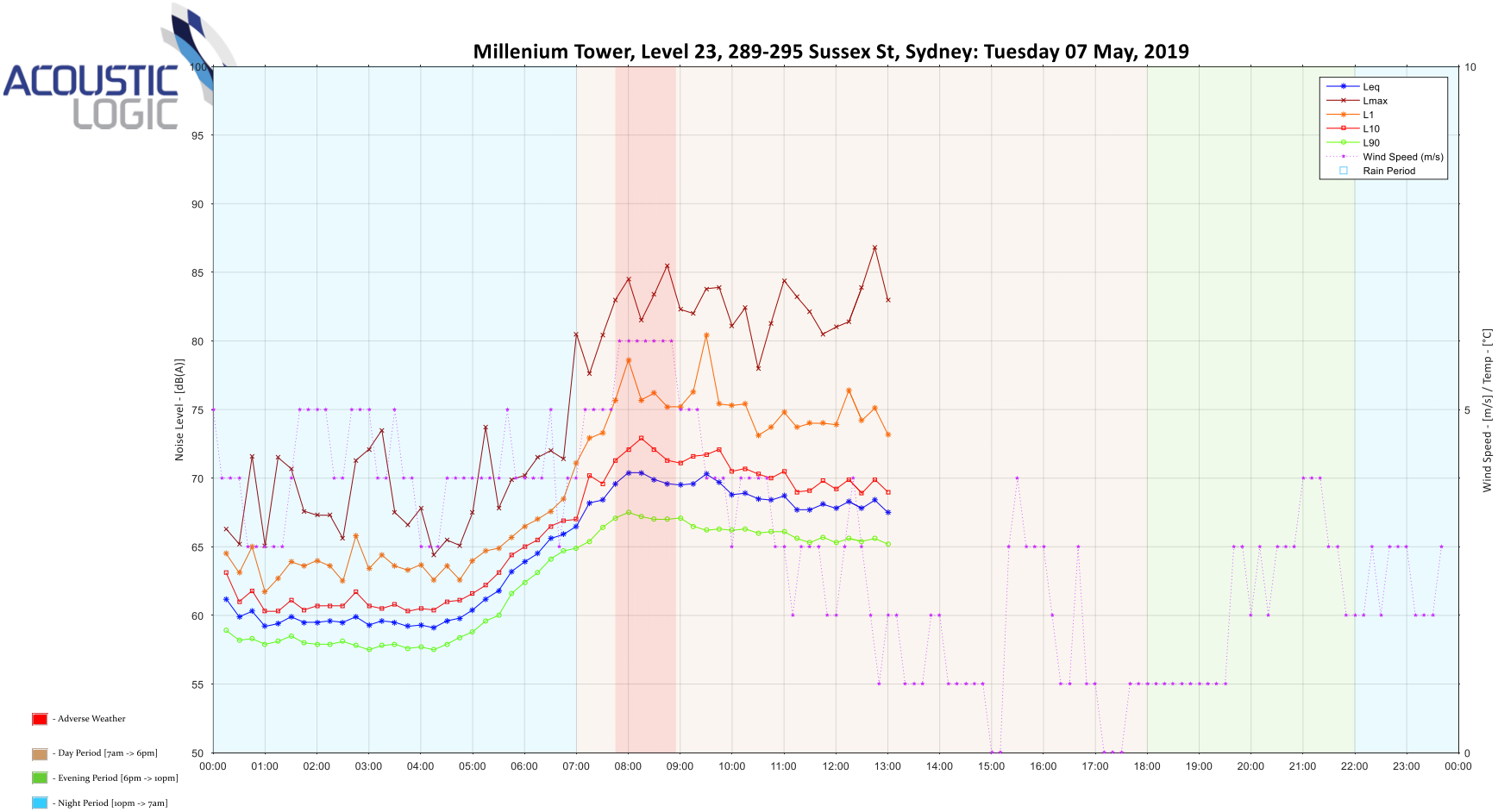
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Tuesday 07 May, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]